Algebra Pond

Brief Overview

In this unit students will skip count, find the missing addend and compare numbers using <, >, =. Students will also analyze numeric patterns in order to skip count by 2's, 5's, and 10's starting with any whole number up to one hundred. Students will complete a number sentence in order to identify the unknown variable.

NTCM Content Standards

- Describe, extend, and make generalizations about geometric and numeric patterns
- Represent and analyze patterns

Grade/Level:

Grades 2-3

Duration/Length:

3 lessons approximately 45 minutes per lesson

Student Outcomes:

Maryland Voluntary State Curriculum

Standard 1.0 Knowledge of Algebra, Patterns, and Functions

A. Patterns and Functions

1a-b. Students will identify, describe, and create numeric patterns by using skip counting by 2's, 5's' and 10 starting with any whole number and using whole numbers to 100.

B. Expressions, Equations, and Inequalities

1a. Students will write and identify expressions by representing numeric quantities using operational symbols and whole numbers to 25.

2. Identify write and solve equations and inequalities

a. Students will represent using appropriate relational symbols (<, >, =) and operational symbols (+, -) with whole numbers to 100.

b. Students will find the missing number (unknown) in a number sentence using operational symbols (+, -) with whole numbers up to 50.

C. Numeric and Graphic Representations of Relationships

1. a. Students will locate points on a number line and represent whole numbers up to 100 on a number line.

Materials and Resources:

Lesson 1

- Blank hundreds chart (class set)
- Colored construction paper squares numbered 1-100
- Class set stickers with three types of animals from the pond ex. ducks, frogs, turtles, fish,
- Sidewalk chalk/ painter's tape
- Teacher Resource 1 Directions for Leaping Lily Pads
- Student Resource1 Hundreds chart (class set)
- Student Resource 2 Independent Activity:
- Student Resource 3 Answers to SR 1
- Student Resource 4 Center Activities Leaping Lily pads File Folder Activity
- Use construction paper to create skip counting
- Teachers Resource 2 Colored squares with numbers
- Teacher's Resource 3 One Hundred's Chart

Lesson 2

- Student Resource 5 Unifix cubes
- Student Resource 6 Ziploc bags
- Teacher's Resource 4 Frog Pattern Puppet
- Elevator Magic by Stuart Murphy
- Student Resource 7 Sentence strips (class set)
- Student Resource 8 Independent Activity
- Teacher's Resource 5 Answers to Student Resource 8
- Teacher's Resource 6 Finding Missing addend

Lesson 3

- Teacher Resource 7 Lyrics for 2 Little Birds
- Teacher Resource 8 Word wall Words
- Teacher Resource 9 Birds in a Tree Transparency
- Student Resource 9 Directions to Add-end Toss
- Student Resource 10 Independent Activity : Comparing Sums
- Teacher Resource 10 Answers to Student Resource 9 Teacher
- Resource 11 Directions for song/ activity
- Student Resource 11 Summative Assessment
- Teacher Resource 12 Answers for Summative assessment

Reference/Other Resource Materials

- Missing Mittens by Stuart Murphy
- Leaping Lizards by Stuart Murphy
- Spunkey Monkeys on Parade by Stuart Murphy
- Elevator Magic by Stuart Murphy
- Counting by Sara Pistoia
- Mission Addition by Lauren Leedy

- 101 Great Classroom Games by Alexis Ludewig and Amy Swan Ph.D.
- How Much is a Million? By David M. Scwartz
- Development/Procedures

Lesson 1

Pre-Assessment

Students will complete skip counting patterns in their math journals (ex. 2, 4, 6, __, ___, ___)

Launch

- Distribute cards/colored squares with numbers missing from hundreds chart (Teacher Resource 2) to the students. Students may have more than one card if class size is less than 30.
- Instruct students to assemble each card in numerical order onto the hundreds chart grid (Teacher Resource 1) shown on the board.
- Students should complete a one hundreds chart that has missing numbers. Informally assess students as they place their numbers on the hundreds chart and count from 1-100.

Teacher Facilitation

- Introduce and model patterns from the chart created with color coded squares. Orally review patterns found with colors and numbers. Discuss patterns students observed in the one hundreds chart (ex. skip count by 2's. Sticker will be placed on the numbers 2, 4, 6, etc.)
- Distribute a one hundreds chart to students (Student Resource 1).
- Model a skip counting pattern with stickers on a blank one hundreds chart. Model identifying and recording the pattern observed.

Student Application

- Students will create patterns on individual one hundreds chart using animal stickers.
- Students will count by 2's and cover all the multiples of 2 with a duck sticker. Students will count by 5's and cover all the multiples of 5 with a frog sticker. Students will count by 10's and cover all the multiples of 10 with a turtle sticker.
- Students will identify the rule and write the pattern rule for each (ex skip counting pattern: 2,4,6,8, etc, pattern rule: increase by 2)
- Students will be given about 15-20 minutes to complete this activity
- The class will discuss patterns created or observed on the hundreds chart (ex. skip counting by 2 and 5 both land on the number 10, 20, 30, or numbers ending in 0).

Embedded Activity

Students will use a new one hundreds chart to create their own skip counting pattern. They will write to explain the pattern created in their math journal.

During discussion, have the students share their one hundreds chart with the class. As a class guess the skip counting pattern and the pattern rule. Teacher will informally assess the students understanding through informal observation and accuracy of patterns created with stickers.

Reteaching Activity

Students will participate in the Game Leaping for Lily Pads (Teacher Resource 5) in order to reinforce skip counting patterns.

Extension Activity

Students that have shown mastery of the concept will work individually to complete another skip counting activity (Student Resource 2, Answers: Teacher Resource 3). They will also complete teacher generated center activity (Center Activity Sample Teacher Resource 4) related to the unit. Students that require further clarification can work in small group instructional setting with the teacher.

Lesson 2

Pre- Assessment

Students will be presented with a few number sentences that have missing addends. The students need to find the difference between the known addend and the sum in order to find the missing addend.

Launch

Ask the students, "What number sentences can be made from the numbers 2, 5, and 7?" Have the students write the fact family in their math journals.

Teacher Facilitation

- The teacher will read the book, Elevator Magic, to the students which is a story about the math concept, finding an unknown.
- Introduce and model the concept of finding missing addends.
- Create a large number line from 0-25.
- Distribute a sentence strip to each child to create their own number line.
- Explain that Froggie the Puppet is having trouble finding the correct lily pad. He starts at lily pad #5. Can you help Froggie find out how many lily pads he has to hop on to get to #7? Model how to show students that if Froggie started at lily pad #5, he would need to jump on 2 pads to get to lily pad #7.
- Try to solve another Froggie the puppet problem using different lily pad numbers for example starting at lily pad #10 and ending up at lily pad #17. The third problem would be starting at lily pad #15 and ending up at 25? Please record the number sentences on the number sentences sheet.

Student Application

- Students will listen to the book, Elevator Magic.
- Students will work with a partner using their number lines to solve Froggie the puppet problems. They will record their answers in their math journals.

Embedded Assessment

The teacher will informally assess the students' understanding by informal - observation during student application time.

Extension Activity

Students who displayed mastery of this concept will play a game in which each student gets a ziploc bag with ten red cubes and ten blue cubes. They are to think of 4 ways to make 15. They can work in pairs. They are to use different color cubes for each addend. In the example 5+10= 15 they can model the number sentence to show it as 5 red cubes and 10 blue cubes. They are to record the various number sentences in their journal. Then have students repeat the process finding four ways to make a sum of 18.

Reteaching Activity

Students who had a difficult time with the concepts incorporated in the student application will work in a teacher facilitated group using counters to complete missing addend problems.

Lesson 3

Pre-Assessment

Students will be presented with a set of addition and subtraction problems with and without missing addends. Students will identify the largest sum in each set.

Launch

Hum or Sing " The Five Little Monkeys Song" to familiarize students with tune.
Explain that class will sing a song that has the same tune as 5 Little Monkeys but the song is about 2 little birds.
Have students sing lyrics to 2 Little Birds (Teacher Resource 6). Sing a few times until students pick up the lyrics, include hand motions.

Teacher Facilitation

- Introduce word wall words (Teacher Resource 7). Teacher should add these words to word wall. Model symbols <,>, and = with hand motions
- Introduce and Assemble Birds at the Pond Transparency (Teacher Resource 8)
- Explain that the alligator's mouth represents the <,>, = symbols
- On a transparency write an addition problem with and without a missing addend.
- Students should solve the problems on both birds and record their answers.
- Together sing 2 Little Birds.
- Model hand motions for alligator to eat greatest number (hands together to make an angle/ greater than symbol) written on the transparency. If answers are similar students should show the motion for equal to (hand over hand with space in between).
- Students should show the correct hand motion to complete the comparison.

Check accuracy of the students hand positions after each problem.

- Discuss reasons for placing hands in that direction.
- Introduce and model how to record and recite comparing number sentences using vocabulary greater than, less than, equal to.
- Explain and Model "Add-end" Toss Game (Teacher Resource 9)
- Distribute recording sheets and number generators for cooperative learning activity "Add-end" Toss (Student Resource 8).

Student Application

- Students will work in pairs to solve numeric quantities using operational symbols +, - and represent relationships using appropriate rational symbols <,>, =
- Students will work in pairs to play "Add-end" Toss Game.
- Challenge students to analyze outcomes with partner (ex. Joe won the game because he had a larger sum than Sue).

Embedded Assessment

- The teacher will observe cooperative learning pairs as "Add-end" Toss is played. Teacher can collect completed recording sheets for "Add-end" Toss from each pair to check for understanding.

Extension Activity

Students can play "Add-end" Toss with a new partner.

Reteaching Activity

Distribute an index card with a 1, 2, or 3-digit number to each student. Display an index card with the number, 20, written on it. Then sing the verse of the song provided on Teacher Resource 11. Encourage those students with a number that meets the criteria of the song (<, >, =) to stand and join in with the singing. Continue the song and activity until each child has an opportunity to sing. Choose a new number and follow th same procedure. After each verse, or after you have ended the song, discuss and display relationships between numbers using appropriate rational symbols <, >, =. (Ex. 45< 52)

Summative Assessment:

Students will be assessed on the concepts of skip counting, finding the missing addend, and finding and comparing sums using Student Resource 9, and Teacher Resource 12 (Answer Key).

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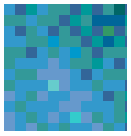
greater than >
less than <
equal to =
missing addend 4 +  = 6
sum 3 + 7 =

Student Resource 1

100's Chart

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Teacher Resource 3

100's Chart

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

“Add-end” Toss

Set up

Copy and distribute the recording sheet to each student pair.

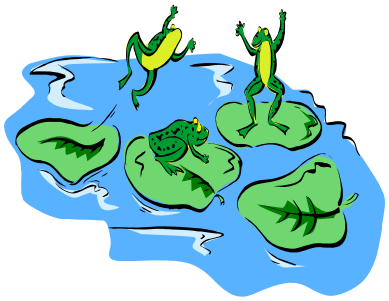
How to Play

Students in pairs write their names at the top of the recording sheet. Players take turns rolling the number generators and adding numbers. After the roll, each player should write down the complete number sentence (ex. 4+5=9). Remember to check work! Both players should record an appropriate symbol between the two sums. The player with the larger sum will draw a rectangle around their number sentence. Play continues until all ten rounds have been played or time is called. The player with the most rectangles is the winner.

Add-end Toss Recording Sheet

Player 1	Player 2
_____	_____
Name	Name
1. _____ + _____= _____	1. _____ + _____= _____
2. _____ + _____= _____	2. _____ + _____= _____
3. _____ + _____= _____	3. _____ + _____= _____
4. _____ + _____= _____	4. _____ + _____= _____
5. _____ + _____= _____	5. _____ + _____= _____
6. _____ + _____= _____	6. _____ + _____= _____
7. _____ + _____= _____	7. _____ + _____= _____
8. _____ + _____= _____	8. _____ + _____= _____
9. _____ + _____= _____	9. _____ + _____= _____
10. _____ + _____= _____	10. _____ + _____= _____

Leaping Lily Pads



Set Up

Use tiles in classroom/ café/ multipurpose room to create a floor-sized hundreds chart or use side walk chalk to create one hundreds chart on the blacktop.

Directions
Tell students that they are going to skip count by various numbers.

1. Have a student stand on a number on the floor-sized hundreds chart. Be sure to mark that spot. Choose a skip counting pattern. Do not tell the class the rule for skip counting.
2. Then give directions to hop on the next number in the skip counting pattern. Be sure to mark that spot.
3. Repeat step 2 a few times in order for students to guess the pattern for places hopped.
4. Repeat steps 1-3 with a new pattern.

You may wish to give your students a hundreds chart to color the called numbers in order to create patterns (individually or with a partner) as the game is being played.

Lesson 3 Reteaching Activity/Song “As I Wish”
Call and Response Sung to the tune “Shortnin’ Bread”

Verse 1

Who has a number less than [20],
less than [20], less than [20]?
Who has a number less than [20]
As I wish?

I have/ (she has) a number less than [20],
less than [20], less than [20],
I have/ (she has) a number less than [20] as you wished.

Verse 2

Who has a number greater than [40],
greater than [40], greater than [40]?
Who has a number greater than [40]
As I wish?

I have/ (she has) a number greater than [40],
greater than [40], greater than [40],
I have/ (she has) a number greater than [40] as you wished.

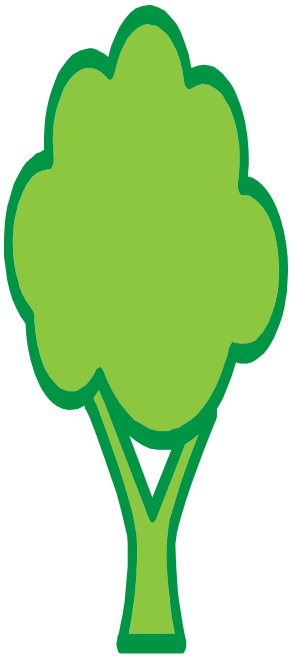
Birds At the Pond Display

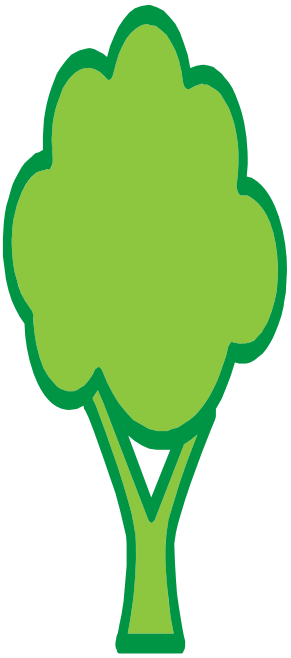
Set Up

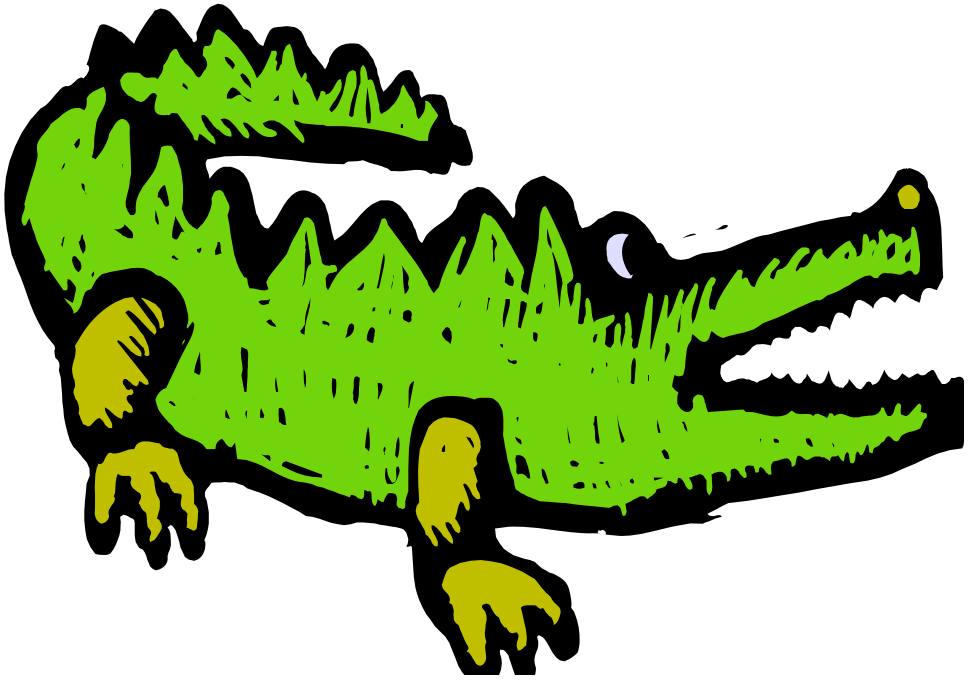
On the board:
Place Bird in Tree facing Right on the Left of the blue square (pond).
Place Bird in Tree facing Left on the Right of the blue square (pond).
Use Alligator to show (<, >, =). Place correct alligator in the circle.

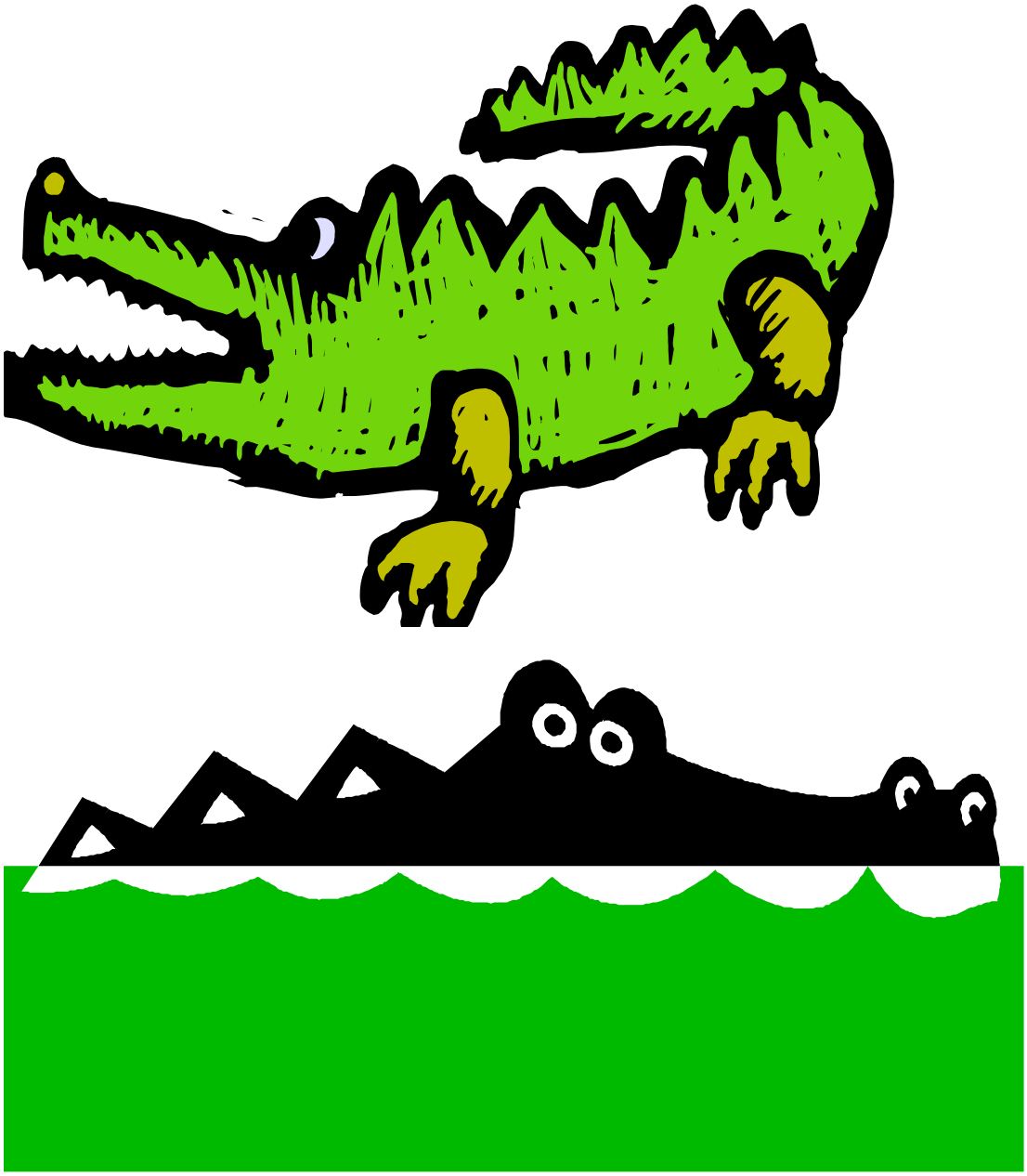
See set up below)

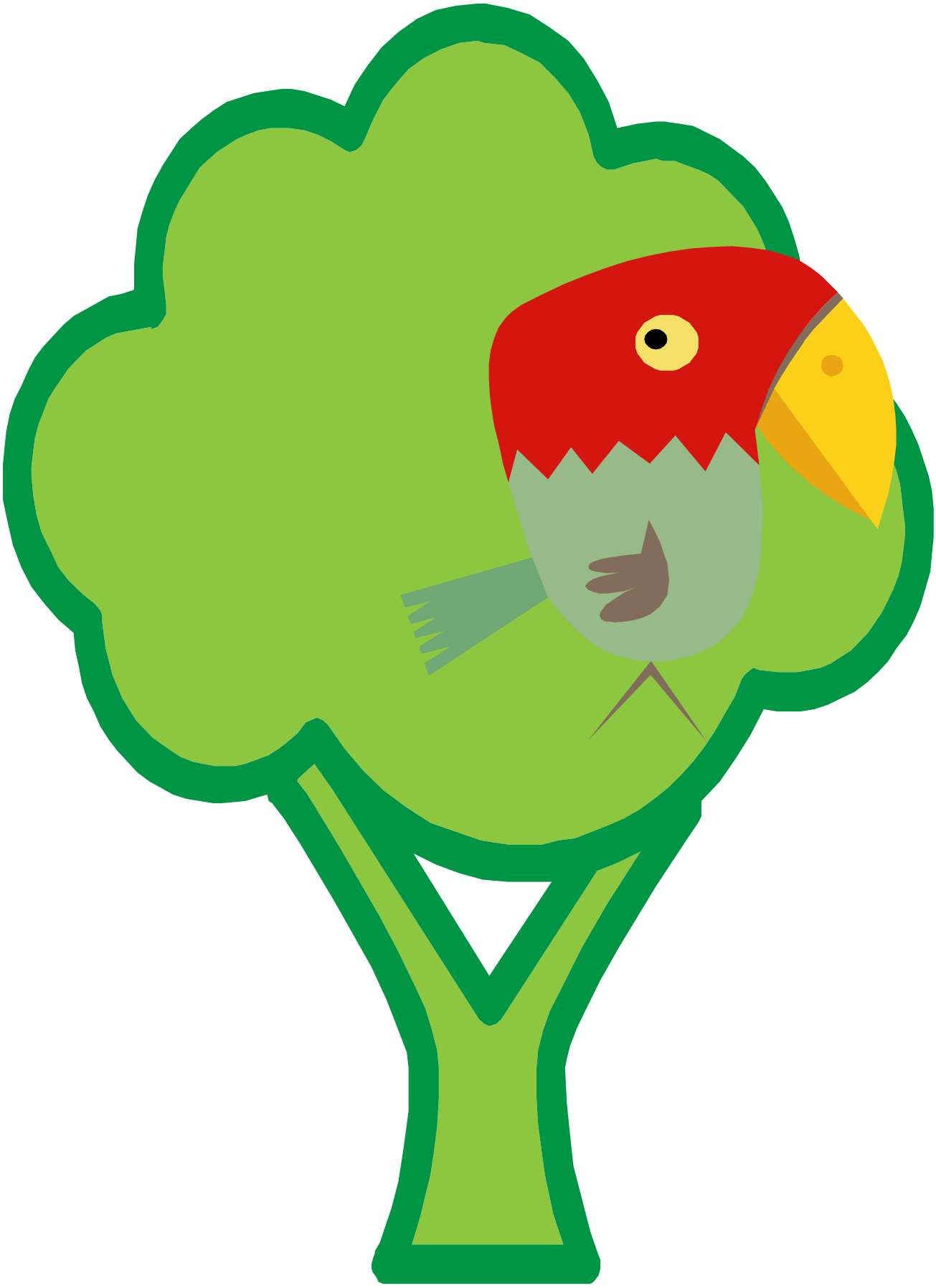
Helpful Hint
Laminate before using. Use dry erase markers to write on display.











Name_____ Date _____

Find the Missing Addend

1) 4 + _____ = 9

2) 6+ _____ = 14

3) 7 + _____= 16

4) 10 + _____ = 10

5) 5+ _____= 8

6) 7+ _____= 14

7) 9 + ____ = 17

8) 8+ ____ = 9

9) 11+ ____ = 13

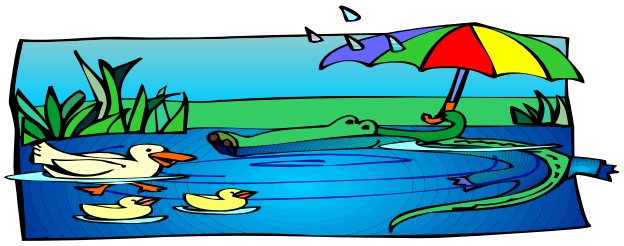
10) 5 + _____ = 14

Answer Sheet Lesson 2

1) 5
2) 8
3) 9
4) 0
5) 3
6) 7
7) 8
8) 1
9) 2
10) 9

Name_____ Date_____

Less Than, Greater Than, or Equal To



Directions: Fill in the blank with the symbols <, >, or =.

1) 12 ◯ 2

2) 19 ◯ 5

3) 1 ◯ 7

4) 16 ◯ 16

5) 2 ◯ 8

6) 14 ◯ 18

7) 3 ◯ 7

8) 20 ◯ 19

9) 9 ◯ 6

10) 11 ◯ 11

Answer Sheet for Formative Lesson 1

1) >
2) >
3) <
4) =
5) <
6) <
7) <
8) >
9) >
10) =

Name_____ Date _____

Summative Assessment

Complete the Number Pattern

1)10, 20, _____, _____, 50, _____, 70, _____, 90, 100

2) 50, 45, _____, 35, _____, 25, _____, 15, _____

3) 2, ____, 6, _____, 10, _____, 14, _____, 18

Find the Missing Addend

4)12+ _____= 24

5) 20+ _____= 40

6) 8+_____= 16

7) 9+ _____= 20

Complete the sum and write <, >, or =.

8) 20 + _____ =30 ◯ 30 + 5=_____

9) 15 + _____ =45 ◯ 25 + 10=_____

10) 10 + ____ =30 ◯ 25 + 5= _____

Answer Sheet Summative Assessment

1) 30, 40, 60, 80
2) 40, 30, 20,10
3) 4, 8, 12, 16
4) 12
5) 20
6) 8
7) 11
8) 10, <, 35
9) 30, >, 35
10) 20 ,= , 30